Abstract Details

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Title: Internal crustal movement and strain from the Korean GPS Network (KGN)

Abstract:

The Korean peninsula is located between North and South China Blocks and Japanese Island Arc as a part of Eurasian or Amurian Plate. The seismic activity in the Korea peninsula is relatively low compared with the neighbor countries China and Japan. But the available seismic information shows that the Korean peninsula is not totally safe from the earthquake disaster. Since the late 1990s, five Korean governmental agencies have installed nationwide permanent GPS tracking stations called the Korean GPS Network (KGN). As of 2004 the total number of sites of KGN are more than 70. Most of the stations are operated as geodetic-quality sites, and their data are used for atmospheric science and geodynamical studies such as crustal deformation in Korea and plate tectonics around Korean peninsula. Some sites are being operated as reference stations for vehicle/marine navigation in DGPS (Differential GPS) and RTK (Real-Time Kinematic) applications. We estimated the relative velocities of the KNGN stations with respect to the IGS site, DAEJ. Three years of GPS data (March 2000 to March 2003) from KGN were processed with Bernese software version 4.2. The resulted velocities show that the northern part of the study area has a predominant movement in the counterclockwise direction with an average velocity of nearly 2 mm/yr. Monitoring the variation of the crustal strain in space and time is the key in understanding the geophysical process in the earth's crust and to forecast the crustal activity. So the horizontal GPS velocities from KGN are used to estimate the strain parameters in South Korea. We divided the study area into 68 small minor blocks and the strain parameters are estimated at the center of each block. Our results show that the shear strain values do not exceed 0.09 Micro-strain/yr while the average strain values are nearly 0.02 Micro-strain/yr. Our shear strain map shows that the high rates are concentrated in the middle part of the area, which is remarkably agreed with shear trends in the Honam Shear Zone (HSZ) with a direction NE-SW. On the other hand, our dilatation map indicate that the study area have both compression and extensional strains, where the compression strain is found in the NE-SW direction of the area and the tensile strain take place in the NW-SE parts. The depicted strain trend might be due to the relative movement between Taebaeksan Basin and the Okchon Basin.

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